

ELECTRONIC DEVICE WITH DISPLAY VIEWABLE FROM TWO OPPOSITE ENDS

Field of the Invention

This invention relates in general to electronic devices, and more specifically to an electronic device having a display that is viewable from two opposite sides.

BACKGROUND OF THE INVENTION

Modern radio messaging systems capable of transmitting alphanumeric messages and other images have brought about a need for increased display space. In addition the advent of two-way messaging has created a need for more keypad space, including enough space to accommodate a full alphanumeric keypad with which an inbound message can be entered. On the other hand, a desire for smaller portable messaging devices tends to limit the space available for both the display and the keypad.

Another consideration affecting particularly the display is that different users have different preferences concerning how they want to use a portable messaging device. Some users prefer to carry the device in a clothing pocket. Others prefer to wear the device on a belt. Others prefer to carry the device in a handbag or briefcase. Still others prefer to leave the device on a desktop. And, of course, all users want the device to use very little battery power, so that the battery life is long.

Thus, what is needed is a portable messaging device (or other electronic device) that can have both a large display and a full alphanumeric keypad without causing the device to grow undesirably large. In addition, the display preferably should be adjustable to accommodate a variety of usage preferences and should use very little battery power.

SUMMARY OF THE INVENTION

An aspect of the present invention is a portable radio messaging device. The device comprises an antenna for intercepting a message, and a receiver coupled to the antenna for demodulating the message. The device further comprises a processor coupled to the receiver for processing the message, and a display electrically coupled to the processor for displaying an image including the message. The display is constructed and arranged such that the image is viewable from first and second sides of the display, the first and second sides facing opposite one another.

Another aspect of the present invention is an electronic device. The device comprises a processor for processing a message, and a display electrically coupled to the processor for displaying an image including the message. The display is constructed and arranged such that the image is viewable from first and second sides of the display, the first and second sides facing opposite one another.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric drawing of a portable radio messaging device having its display in a first position in accordance with the present invention.

FIG. 2 is an isometric drawing of the portable radio messaging device having its display in a second position in accordance with the present invention.

FIG. 3 is a side view of the preferred embodiment of the display in accordance with the present invention.

FIG. 4 is a front view of a portion of the preferred embodiment of the display in accordance with the present invention.

FIG. 5 is a side view of an alternative embodiment of the display in accordance with the present invention.

FIG. 6 is a side view of the portable radio messaging device depicting a display position detector with the display positioned in the first position in accordance with the present invention.

FIG. 7 is a side view of the portable radio messaging device depicting the display position detector with the display positioned in the second position in accordance with the present invention.

FIG. 8 is an electrical block diagram of the portable radio messaging device in accordance with the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric drawing of a portable radio messaging device 100 having its display 114 in a first (closed) position in accordance with the present invention. The device 100 comprises a display portion 102 and a base portion 104. The display portion 102 and the base portion 104 are rotatably coupled at a common edge by a hinge 106. The display further comprises a first side 116 and a second side 118 (FIG. 2) facing in opposite directions. Both sides 116, 118 are usable for viewing information displayed on the display 114. The display 114 also preferably comprises a conventional touchscreen 108 on the first side 116 for providing user control of the device 100 while the display portion 102 is in a closed position, as depicted in FIG. 1. Note also that a message 110 is readable on the display 114 in the closed position.

FIG. 2 is an isometric drawing of the portable radio messaging device 100 having its display 114 in a second (open) position in accordance with the present invention. Preferably, the display 114 is transparent except for a layer forming the active pixel elements of the display, so that the displayed image is visible from either side of the display 114. Note also that the message 110 has been flipped vertically in order to maintain a correct orientation of the image. Preferably the vertical flipping is performed automatically in response to the display 114 being moved from the first (closed) position to the second (open) position, as described further below. When in the open position, a keypad 112 is revealed for composing locally entered messages. As the keypad 112 can include additional user controls for controlling the device 100, preferably no touchscreen is included on the inner surface of the display 114. It will be appreciated that, alternatively, a touchscreen can be provided on the second side 118 of the display 114 as well. It will be further appreciated that the keypad 112 can be constructed of any suitable type of alphanumeric entry device, including a membrane pad, a touch pad, a touch screen, a mechanical key switch, and a silicone pad, to name a few types.

FIG. 3 is a side view of the preferred embodiment 300 of the display 114 in accordance with the present invention. The preferred embodiment 300 comprises two transparent, rigid outer seals 302, preferably constructed of glass. Plastic spacers 304 maintain separation of the outer seals 302. A matrix of transparent display electrodes 306 and a transparent counter electrode 308 are formed by plating a transparent, conductive material, such as tin oxide, onto the inner surfaces of the seals. An electrochemical material 310, e.g., polyaniline, is disposed between the display electrodes 306 and the counter electrode 310. It will be appreciated that, alternatively, other suitable materials can be utilized as well for the outer seals 302, display electrodes 306, counter electrode 308, and electrochemical material 310.